I claim:

1. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep comprising a source of light adapted for focusing a spot of light on the interior surface of said tubes; means for focusing said light source on the interior surface of said reformer tube, and a detector for detecting said spot of light focused on the interior of said reformer tube, and means for centering said source and said detector in the center of said tube; and means for moving said detector, source, and centering means through said detector tube.

2. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 1, wherein said means for focusing said spot on the surface of said reformer tube includes a laser source and optical detector in a rotating head for rotating said spot around the inner circumference of said reformer tube.

3. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 2 wherein said source is positioned forward of said detector in a direction away from the probe body and centering device.

4. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 1, wherein said centering device is adapted for use in reformer tubes by preventing chemical interaction with the inside surface of said reformer tube.

5. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 4, wherein said centering device is

constructed so that all surfaces which may potentially contact the interior of said tube are constructed out of nonmetallic materials.

6. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 1, wherein said focusing means includes a conical mirror for projecting a focused ring of light on the interior surface of said reformer tube.

7. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 6, wherein said conical mirror is parabolic to focus said ring to a small circumferential line.

8. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 6, further comprising signal processing means to reduce the bandwidth of information transported out of said reformer tube.

9. A method for forming a profile of the radius of the interior of a tubular structure comprising the steps of; producing a light beam on the axis of said tube, collimating said beam to focus on the surface of said tube, forming said collimated beam into a ring on the surface of said tube, projecting an image of said ring onto the surface of a sensor and moving said ring down the axis of said tube.

10. A method for forming a profile of the radius of the interior of a tubular structure as in claim 9, further comprising the step of reflecting said beam off the surface of a conical mirror.

11. A method for forming a profile of the radius the interior of a tubular structure as in claim 9, further comprising the step of reflecting said beam off the surface of a conical

mirror with a parabolic surface for maintaining focus of said beam on the expected tube diameter.

12. A method for forming a profile of the radius of the interior of a tubular structure as in claim 9, further comprising the steps of, reflecting said beam off a mirror at the axis of said tube, and rotating said mirror to produce a ring of light on the surface of said tube.

13. A method for processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image comprising the steps of, converting a signal having an X position, a Y position, and an intensity component to a signal having an angle, a radius, and an intensity and filtering out all signal sets that do not have a radius greater than a predetermined radius.

14. A method for processing a signal as in Claim 13, wherein said converting step is accomplished by use of a look-up table for rapid conversion of X and Y pixel addresses to an angle and a radius.

15. A method for processing a signal as in Claim 14, wherein said look-up table is loaded during initialization of said system.

16. A method for processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image as in claim 13, comprising the further step of discarding all data sets whose intensity signal does not exceed a predetermined value.

17. A method for processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image

as in claim 16, where in said predetermined value is set during calibration to include only a range of. Values within an expected deviation of the radius of said tube.

18. A method processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image as in claim 16, where in said predetermined value is set during calibration to include only a range of values within a expected deviation of the intensity of a reflected signal

19. A method processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image as in claim 16, comprising the further step of converting the analog output of an image sensor into a digital signal by synchronizing the clock of the image sensor with the intensity output to produce said X and said Y signal.

20. A method processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image as in claim 16, comprising the further step of storing each angle, radius, intensity, data set in a register for later download and processing.

21. A method processing a signal that includes X, Y, and intensity data sets for each pixel of said sensor from an image sensor receiving a substantially ring shaped image as in claim 20, wherein only values within a preselected range are stored in said register.

22. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting comprising the steps of shining a spot of light onto the interior of said tube and detecting the reflection of said spot by converting light into an electrical signal, processing said signal to determine the radius of said tube.

23. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting as in claim 22 comprising the further step of rotating said spot by reflecting it off the surface of a rotating mirror.

24. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting as in claim 23 wherein said detecting step is preformed by a charge coupled detector array.

25. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting as in claim 24 wherein said detector array is positioned aft of said spot of light.

26. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting as in claim 22 comprising the step of reflecting said spot off a conical mirror to focus said spot into a ring on the interior surface of said tube.

27. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting as in claim 26 comprising the further step of processing said signal in said tube to remove unneeded information.

28. A method for inspecting a reformer tube for chemical processing for damage including creep and metal dusting as in claim 26, wherein dynamic range is increased by the use of multiple parallel gain stages.

29. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 1, wherein the rotating portions of said device are adapted for high speed operation above 1500 revolutions per minute.

30. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 29, wherein said high speed operation is achieved by using a material that is substantially lighter than metal for the body of said device.

31. A device for inspecting the interior of metal tubes used in chemical processing for the presence of metal dusting and creep as in claim 30, wherein said body is substantially smaller than the inside diameter of the tube sought to be inspected allowing inspection of several tube diameters.